Changes to the DEIS are highlighted in the FEIS

Volume I

Final Environmental Impact Statement for the Bellefonte Conversion Project

EXECUTIVE SUMMARY

Tennessee Valley Authority
October 1997

Changes to the DEIS are highlighted in the FEIS

FINAL ENVIRONMENTAL IMPACT STATEMENT
OCTOBER 1997

BELLEFONTE CONVERSION PROJECT

Responsible Federal Agency: Tennessee Valley Authority

Abstract: The Tennessee Valley Authority (TVA) proposes to convert and operate the unfinished Bellefonte Nuclear Plant as a fossil-fueled power plant. The proposed action would undertake conversion of completed and partially completed facilities; modification and addition of equipment; construction of new facilities; and subsequent operation of facilities at the Bellefonte Nuclear Plant to produce electricity using fossil fuels. Operation of the proposed Bellefonte facility as a fossil-fueled power plant would produce up to 2,895 megawatts of electric power, dependent on the conversion option selected.

The environmental consequences of five alternatives for conversion of Bellefonte were evaluated. The five alternatives are: (1) Pulverized coal (PC), (2) Natural gas combined cycle (NGCC), (3) Integrated gasification combined cycle (IGCC), (4) IGCC with chemical coproduction (IGCC/C), and (5) Combination of NGCC and IGCC/C (Combination). NGCC is TVA's preferred conversion option. Some characteristics of these alternatives are given in the table below.

	PC	NGCC (Preferred)	IGCC	IGCC/C	Combination
Total Electric Capacity (MW)	2,400 Base	2,206 - Base 2,406 - Peaking	2,720 Base	450 Base	2,565 - Base 2,895 - Peaking
Fuel(s)	Coal (Fuel Oil startup)	Natural Gas (Fuel Oil backup)	Coal, Petroleum Coke (Fuel Oil startup)	Coal, Petroleum Coke (Fuel Oil startup)	Coal, Petroleum Coke, Natural Gas (Fuel Oil backup)
Footprint (acres)	190	46	190	225	225
Coproducts	Gypsum	None	Sulfur, Slag	Sulfur, Slag, Chemicals	Sulfur, Slag, Chemicals
Peak Construction Employment	1,612	550	2,155	2,898	3,362

Comments on this Final EIS and requests for further information should be directed to:

Roy V. Carter, P.E.
Project Leader
Tennessee Valley Authority
P.O. Box 1010
Muscle Shoals, Alabama 35662

Telephone: (205) 386-2832
e-mail: rvcarter@tva.gov

For further information you may also contact:

Greg Askew, P.E.
Specialist, National Environmental Policy Act
Tennessee Valley Authority
400 W. Summit Hill Drive, Mail Stop: WT 8C
Knoxville, Tennessee 37902-1499

Telephone: (423) 632-6418
e-mail: gaskew@tva.gov

INTRODUCTION

This Final EIS (FEIS) has been prepared to provide the public and TVA decisionmakers with a description of environmental impacts associated with the proposal to convert the partially completed Bellefonte Nuclear Plant to a fossil plant. Consistent with EPA's guidelines for complying with the National Environmental Policy Act (NEPA), the public and environmental officials are invited to comment on this FEIS. As shown in Table 1 below, the TVA Board of Directors will make a decision respect to the proposed action following the preparation of this Final EIS.

Table 1. Milestones for Bellefonte Conversion EIS

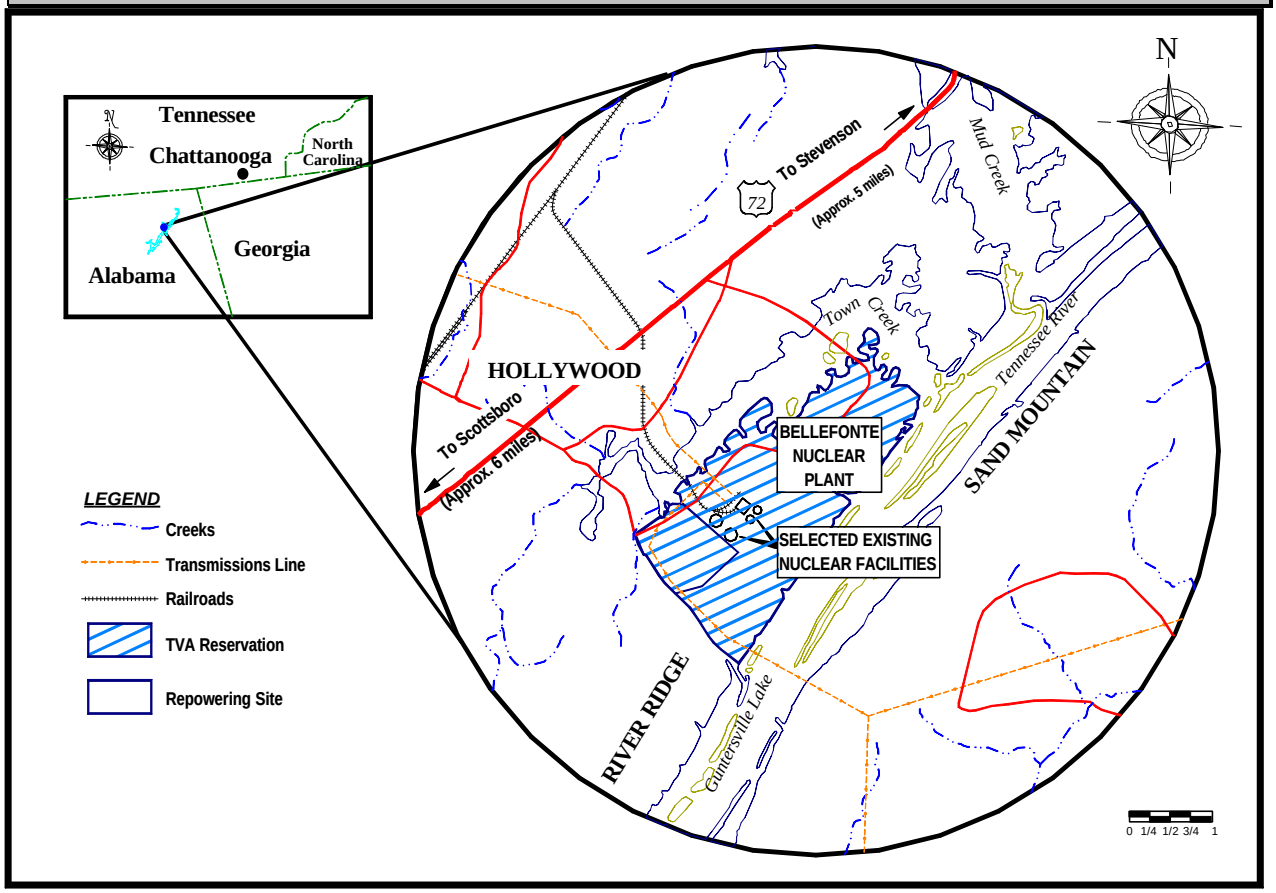
Issue Notice of Intent	April 29, 1996
Public scoping meeting	May 16, 1996
Release Draft EIS	March 13, 1997
Public hearing on Draft EIS	April 8, 1997
Close of public comment period	May 4, 1997
Release Final EIS	October 1997
Issue Record of Decision	November 1997

The proposal to convert Bellefonte is part of a system-wide evaluation of future power needs and a range of options for meeting those needs were discussed in TVA's Integrated Resource Plan and Environmental Impact Statement, Energy Vision 2020, released on December 21, 1995. Energy Vision 2020 was a comprehensive analysis, with extensive public involvement, of long- and short-term actions TVA could take to provide flexible, competitive energy choices for the future.

Recommendations contained in Energy Vision 2020 affecting the use of Bellefonte include the continued deferral of its completion as a nuclear powered facility in the absence of partners who would share the investment risk associated with its construction. Energy Vision 2020's action plan stated TVA's intent to consider other conversion opportunities, namely the conversion of facilities to allow production of electricity from combustion of fossil fuels.

Bellefonte is located on an approximately 1,600-acre site adjacent to the Tennessee River near Hollywood, Alabama (Figure 1). The two-unit nuclear generating plant has a rated capacity of 1,212 megawatts (MW) per unit. The Nuclear Regulatory Commission (NRC) issued the construction permit for Bellefonte in December 1974. By 1988, Unit 1 was 90 percent complete, and Unit 2 was about 58 percent complete. On July 29, 1988, TVA notified NRC that the completion of construction of the Bellefonte Nuclear Plant was being deferred as a result of lower than expected load forecast for the near future. The plant remained in deferred status until March 23, 1993, when TVA notified NRC of plans to complete Bellefonte Units 1 and 2. TVA's decision to complete the Bellefonte plant came after three years of extensive studies that concluded completion of the facility as a nuclear power plant was viable. Subsequently, in December 1994, the TVA Board announced that Bellefonte would not be completed as a nuclear plant without a partner, and put further construction activities on hold until a comprehensive evaluation of TVA's power needs was completed.

Figure 1. Locality Map for Bellefonte



TVA proposes to complete the unfinished Bellefonte Nuclear Plant as a fossil-fueled power plant. The proposed action is conversion, modification, and addition of equipment; the construction of new facilities; and the subsequent operation of the Bellefonte facility as a power plant with an electricity generating capacity of up to 2,895 MW, and chemical production, dependent on the conversion option selected. Among the fossils fuels considered were natural gas, coal, and petroleum coke. The short-term action plan of Energy Vision 2020 recommended several options for converting Bellefonte, including conversion to a combined cycle plant utilizing natural gas or gasified coal as the primary fuel. Recognizing that a degree of uncertainty and market risk were associated with a conversion alternative, an in-depth engineering and financial examination was also initiated to assess and develop the Bellefonte conversion strategy.

PURPOSE AND NEED FOR PROPOSED ACTION

The purpose of the actions proposed in this FEIS is to convert the Bellefonte Nuclear Plant to a fossil-fueled power plant, preferably through the use of natural gas fired combined cycle technology. The need for action to complete Bellefonte stems largely from the past monetary investment in construction activities and facilities at this location. Investment in Bellefonte through December 1995 was about $4.6 billion. However, a cost estimate, developed for Energy Vision 2020, for completing Unit 1 (as nuclear) is $1.3 to $3.5 billion and for Unit 2 is $0.9 to $2.4 billion. A more recent study conducted by NUS Corporation in 1996 determined the completion costs of the two Bellefonte units to be $2.88 billion. The current Bellefonte asset is not producing power. With the TVA Board's decision in 1994 to not complete Bellefonte as a nuclear plant unless a partner is found to share investment and operating risk, the plant could remain in a mothballed condition thereby continuing to be a liability to TVA's financial situation. In addition to making use of an existing asset, the proposed action would also serve the important purpose of meeting future power needs of the region. Energy Vision 2020 concluded that TVA would need 16,500 MW of new capacity between 1998 and 2020 to meet forecasted load growth in the region.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

The objective of the FEIS is to provide environmental data and analyses that will inform the public and TVA decisionmakers of the environmental consequences of proceeding with the conversion of Bellefonte to a fossil fuel power plant. The conversion decision will weigh environmental considerations with

economic and technical aspects of the conversion options. This decision will be documented in a Record of Decision which will be prepared after the issuance of this Final EIS.

The alternatives analysis in this FEIS has been designed to meet these objectives. As discussed later in this summary, there are three tiers of decisionmaking. Tier 1 is to decide between the No-Action Alternative, which is to leave Bellefonte as a partially completed nuclear plant into the indefinite future, and the Proposed Action Alternative, which is to proceed with converting Bellefonte to fossil fuel.

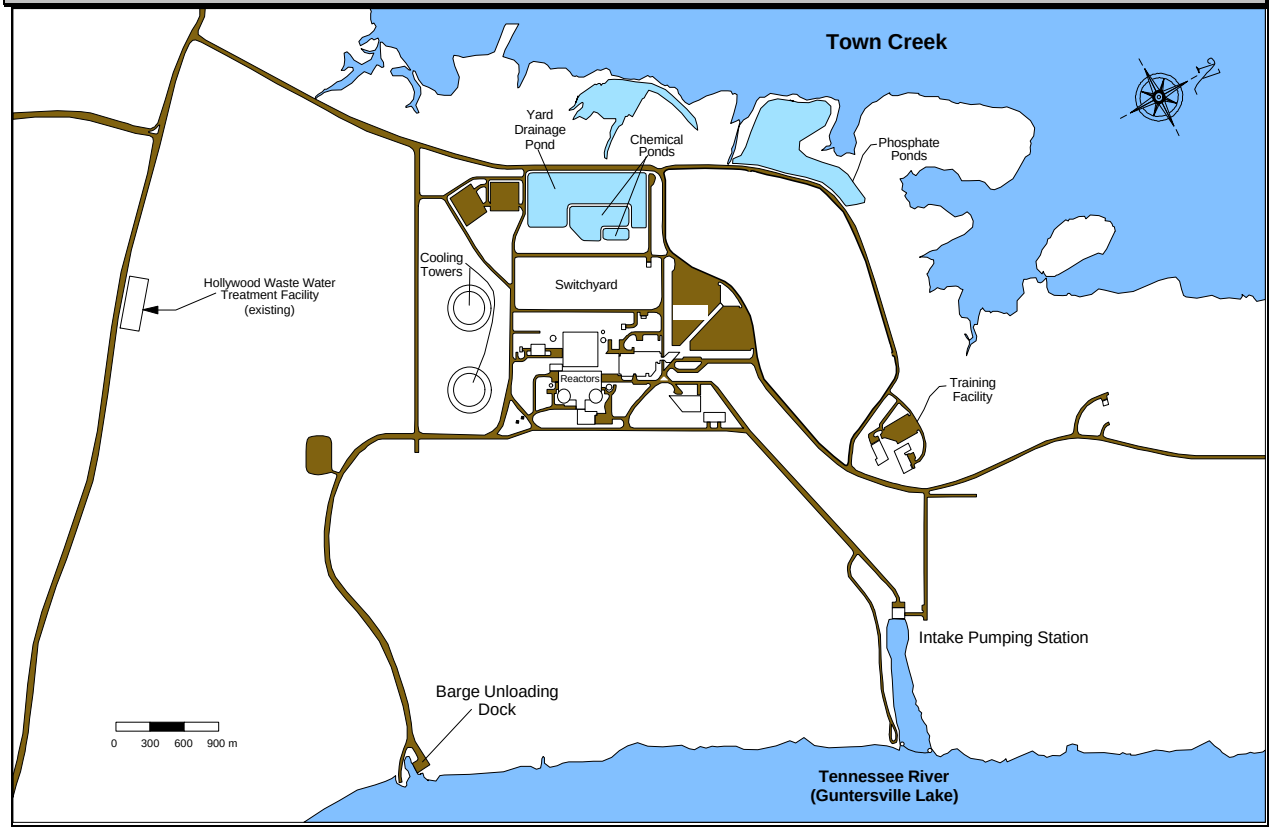
Tier 2 is to select one of five conversion options. The conversion options were derived from information contained in Energy Vision 2020 and data that have become available since the publication of that document.

Tier 3 involves decisions about "suboption choices," basically types of processes, equipment, and modes of operation which cut across several conversion options. An example of a suboption choice would be the type of gasifier that would be used in conversion options involving coal gasification. For most suboptions, it was possible to choose a technology or a mode of operation to represent the suite of likely suboptions, or to establish an envelope that allowed the evaluation of impacts for the "most likely conservative configurations." Conversion option assumptions and configurations reflect these choices.

No-Action Alternative

Continuation of the No-Action Alternative involves the maintenance of the Bellefonte plant as a partially completed nuclear plant. Because of the advanced state of construction (90% for Unit 1 and 58% for Unit 2), deferment involved more than stopping active construction. The lay-up and preservation program has the objective of maintaining the systems, structures, and components for prolonged periods without significant degradation. Approximately 20,000 preventive maintenance activities are performed each year, including verification of the effectiveness of the program, which is accomplished through the use of system engineer walkdowns, corrosion coupon monitoring, and various trend programs. A work force of about 80 personnel are permanently employed at Bellefonte. Figure 2 shows the location of current facilities at Bellefonte. Bellefonte currently holds a minor air source permit and a wastewater discharge permit for maintenance operations. All solid wastes are disposed offsite at permitted landfills, and sanitary wastewater is sent to a treatment plant operated by the City of Hollywood, Alabama.

Figure 2. Current Bellefonte Site Map



Proposed Action Alternative

Drawing from Energy Vision 2020 and information that has become available since its publication, TVA staff compiled a comprehensive list of options for converting Bellefonte, including developing technologies. Each technology option was considered in terms of three criteria.

- Can the technology be used, based on current data, to completely convert Bellefonte?
- Is the technology considered to be at the initial or mature commercial stage of development (i.e., is further demonstration and testing needed to prove the technology)?
- Is the fuel supply adequate for full conversion of Bellefonte?

Options successfully meeting all screening criteria were pulverized coal (PC), natural gas combined cycle (NGCC), integrated gasification combined cycle (IGCC), and IGCC with chemicals coproduction (IGCC/C). Power plants using these technologies would be distinctly different in their emissions,

configurations, and operational characteristics and should be addressed as discrete conversion options. However, it is possible that these technologies could be employed together at Bellefonte. Consequently, a combination option was devised to reflect a phased conversion process using elements of each of the three gasification-based options listed above. NGCC is TVA's preferred fossil conversion option.

These five options, along with a consideration of suboption processes, represent a broad, flexible suite of conversion pathways at Bellefonte for future TVA decision making.

- **Option 1:** **Pulverized coal (PC)**
- **Option 2:** **Natural gas combined cycle (NGCC) - Preferred by TVA**
- **Option 3:** **Integrated gasification combined cycle (IGCC)**
- **Option 4:** **IGCC with chemical coproduction (IGCC/C)**
- **Option 5:** **Combination of NGCC and IGCC/C (Combination)**

Pertinent aspects of each of the five conversion options are described in Table 2.

The five conversion options are briefly described in the remainder of this section. The utilization of existing Bellefonte equipment and new facilities are shown in Table 3.

Option 1: Pulverized Coal (PC) Units

The fully completed PC plant would consist of four 600-MW boilers of the subcritical design, for a total generation capacity of 2,400 MW. Boilers would be equipped with particulate and sulfur dioxide removal systems and specially designed burners that produce less quantities of a noxious gas called nitrogen oxide. The steam generated in the PC boilers would be routed to the existing Bellefonte steam turbines, each turbine being served by two boilers. The steam turbines may be modified to optimize operation of the plant. The locations of the PC power block, coal handling, and combustion residue facilities are shown in Figure 3.

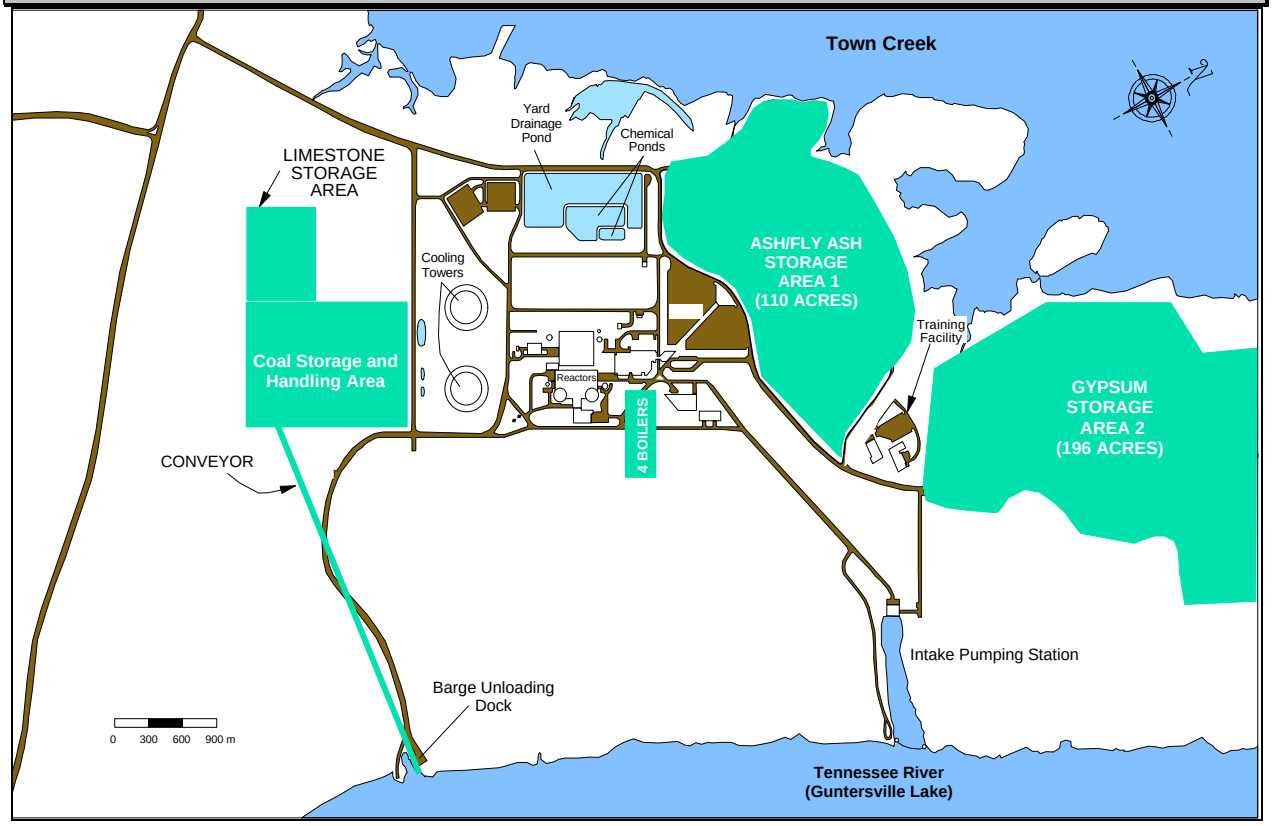
Table 2. Major Features of the Conversion Options

	PC	NGCC (Preferred)	IGCC	IGCC/C	Combination
Total Electricity Production (MW)	2,400	-2,206 - Base Power -2,406 - Peaking Power	2,720	450	-2,565 - Base Power -2,895 - Peaking Power
Fuel(s)	-Coal -Fuel Oil for Startup	-Natural Gas -Fuel Oil as Backup	-Coal -Petroleum Coke -Fuel Oil for startup	-Coal -Petroleum Coke -Fuel Oil for Startup	-Coal -Petroleum Coke -Natural Gas -Fuel Oil as Backup
Fuel Consumed per day	24,974 tons	472 mmscf (with duct burning)	24,000 tons	12,000 tons	12,000 tons 412 mmscf (with duct burning)
Footprint Area (acres)	190	46	190	225	225
By-products	-Gypsum -Ash -Flyash	None	-Sulfur(elemental) -Slag	-Sulfur(elemental) -Slag	-Sulfur (elemental) -Slag
Chemicals Produced	None	None	None	-Acetic Acid -Formaldehyde -MTBE -Urea -Methanol -Ammonia -UAN Solution -Carbon Dioxide	-Acetic Acid -Formaldehyde -MTBE -Urea -Methanol -Ammonia -UAN Solution -Carbon Dioxide
Max. Employees During Construction	1,612	550	2,155	2,898	3,362
Peak Permanent Employment	580	200	200	430	640
Suboptions Considered	-Boilers -Transportation -Solid Fuels -Coal Conveying	-Gas Pipeline -Gas Turbines	-Transportation -Gas Turbines -Solid Fuels -Coal Conveying	-Transportation -Gas Turbines -Solid Fuels -Coal Conveying -Chemicals Production	-Gas Pipeline -Transportation -Gas Turbines -Solid Fuels -Coal Conveying -Chemicals Production

Table 3. Equipment Utilization for Conversion Options

		PC	NGCC (Preferred)	IGCC	IGCC/C	Combination
Existing Bellefonte Equipment						
	Unit 1 steam turbine	✓	✓	✓		✓
	Unit 2 steam turbine	✓	✓	✓	✓	✓
	Unit 1 natural draft cooling tower	✓	✓	✓		✓
	Unit 2 natural draft cooling tower	✓	✓	✓	✓	✓
	Station auxiliaries (compressed air and service water)	✓	✓	✓	✓	✓
	Switchyard and transmission system	✓	✓	✓	✓	✓
	Office and service buildings	✓	✓	✓	✓	✓
New Facilities Needed						
	PC plant modules	4				
	Gasification plants			8	4	4
	Natural gas-fired advanced gas turbine and electrical generators		9			6
	Synthesis gas-fired combustion turbines			8	1	1
	Chemicals plants				1	1
	Bottom ash, fly ash, and gypsum handling and storage facilities	✓				
	Slag handling and storage facilities			✓	✓	✓
	Flare stacks			✓	✓	✓
	Heat recovery steam generators (HRSG) and stacks		9	8	1	7
	Fuel oil storage tanks	✓	✓	✓	✓	✓
	Natural gas pipeline		✓			✓
	Coal receiving equipment for coal received by barge	✓		✓	✓	✓
	Limestone receiving equipment	✓		✓	✓	✓
	Upgraded railroad services			✓	✓	✓
	Facilities for shipping chemicals				✓	✓

Figure 3. PC Power Plant



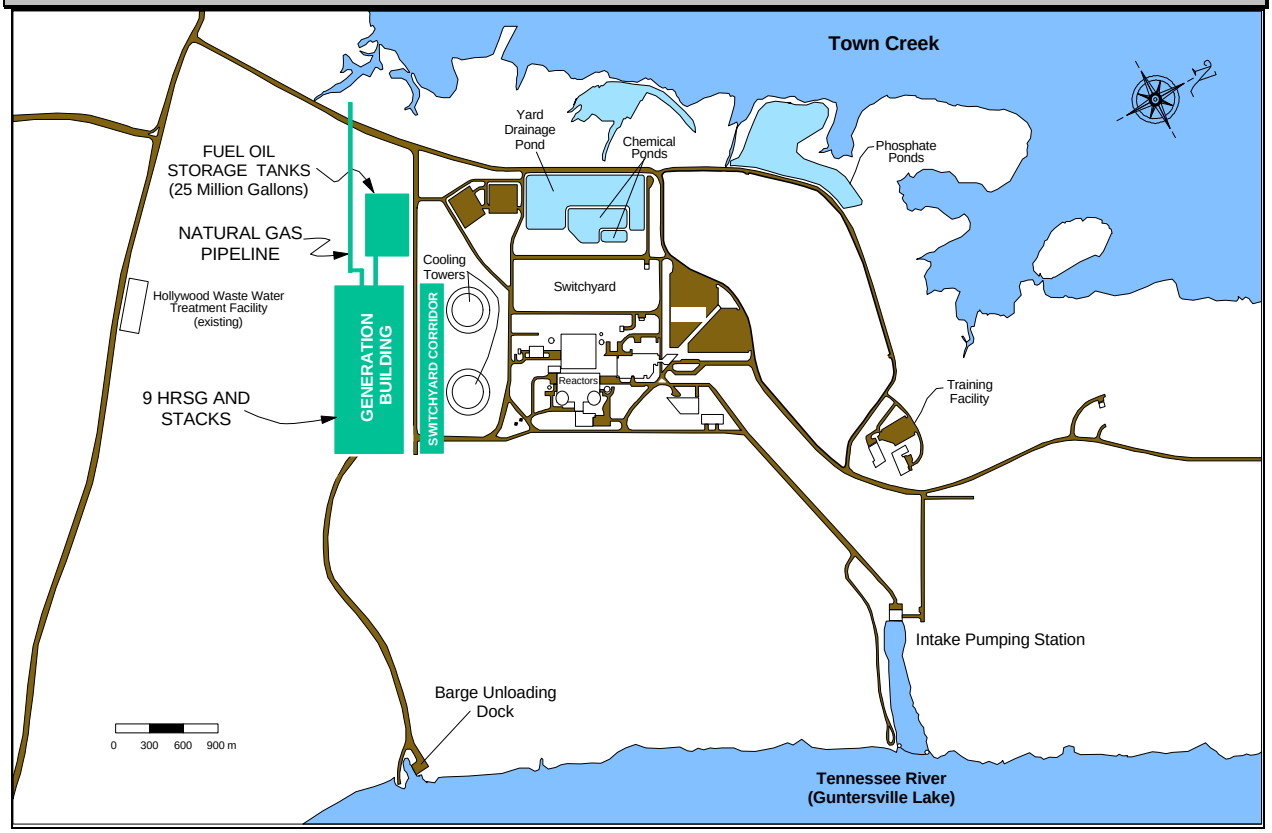
Option 2: Natural Gas Combined Cycle (NGCC) Units - Preferred Option

This option is TVA's preferred conversion option. Natural gas fired combustion turbine combined cycle units, which capture gas turbine exhaust heat to generate steam and drive a steam turbine generator, have been in common use for many years. Advanced combustion turbines are now available to boost simple cycle electrical output by about 50% above older simple cycles and yield plant efficiencies greater than 55%.

The full scale NGCC Option for the conversion of Bellefonte includes nine NGCC modules, each consisting of one gas turbine, one heat recovery steam generator (HRSG), and one stack. The steam generated in the HRSGs would be routed through new high pressure turbines to the existing Bellefonte steam turbine systems. Each one of the two Bellefonte steam turbine systems would be served by four NGCC modules. Optimization of the plant may require replacement or modification of the existing

Bellefonte steam turbines. The power plant's net output would be approximately 2,206 MW with a total natural gas consumption of 434 million standard cubic feet per day. With duct burning, production and natural gas consumption rises to 2,406 MW and 472 million standard cubic feet per day. The locations of the NGCC power block, possible pipeline access, and other features are shown in Figure 4.

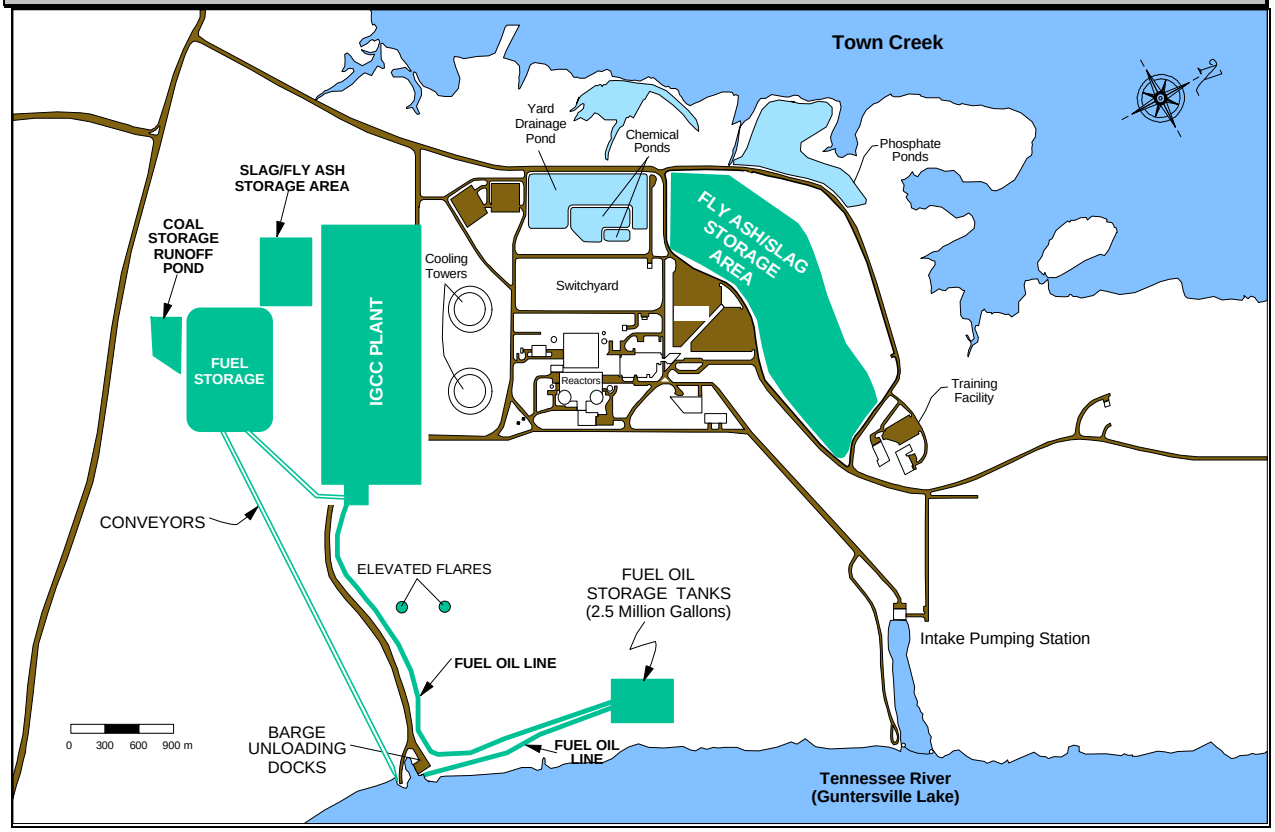
Figure 4. NGCC Power Plant



Option 3: Integrated Gasification Combined Cycle Units

The IGCC Option for Bellefonte consists of eight modules, each consisting of one coal/petroleum coke gasification plant, one combustion turbine, and one HRSG. The steam produced by the eight modules is collected and routed to Bellefonte's two existing steam turbine systems. Each steam system would be served by four modules. Within each steam turbine system, the turbine may require modification. The power plant's net output would be approximately 2,720 MW. The locations of the IGCC power block and associated solids handling and storage areas are shown in Figure 5.

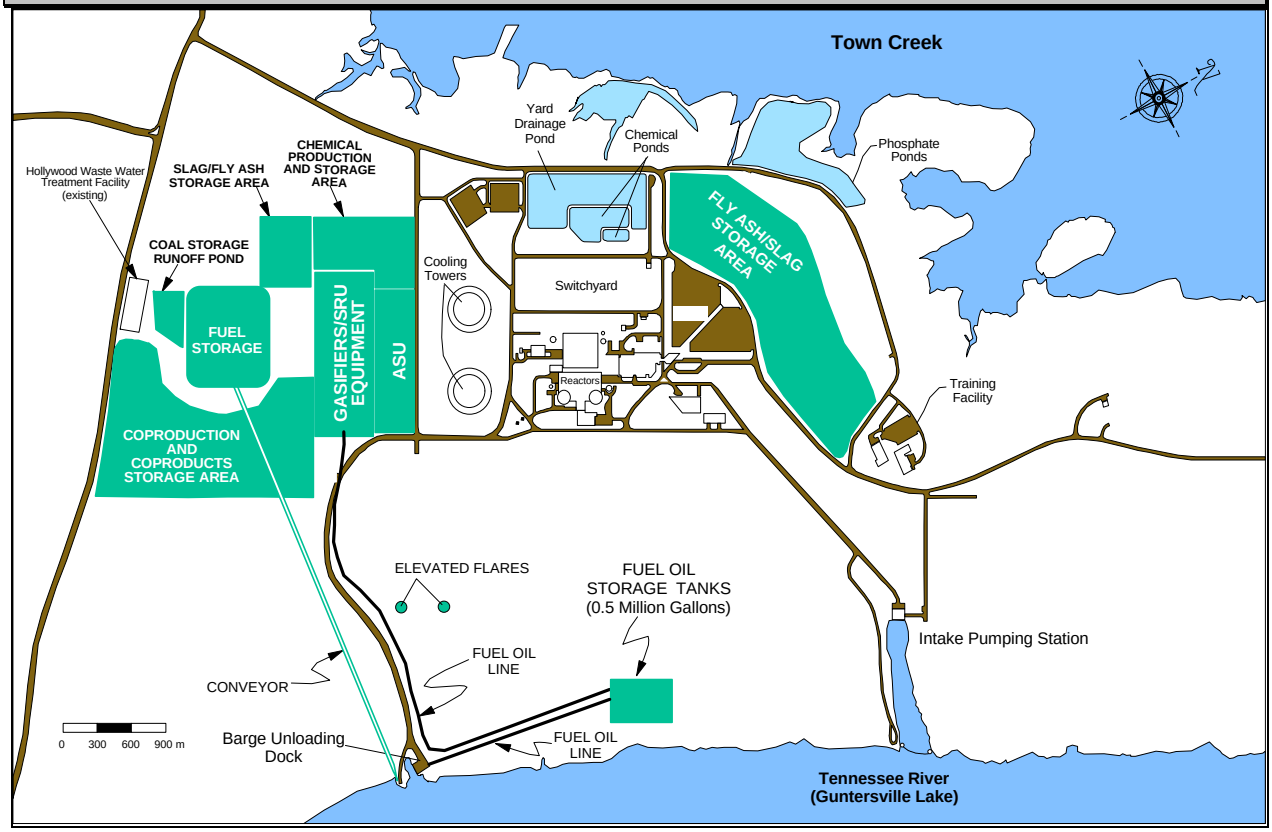
Figure 5. IGCC Power Plant



Option 4: Integrated Gasification Combined Cycle Units With Coproduction

The IGCC/C Option for Bellefonte consists of four modules, one consisting of a coal gasification plant, a combustion turbine, and a HRSG and three consisting of a coal gasification plant each and the related chemical coproduction plants. Approximately 70% of the synthesis gas produced by the four gasification plants would be routed to the chemical plants. The remaining synthesis gas would routed to the combustion turbine combined cycle units. Bellefonte's existing Unit 2 steam turbine system may be modified. The plant's net output would be approximately 450 MW. Total coal and/or petroleum coke consumption would be 12,000 tons/day. The locations of the IGCC/C power block, chemical production, solids handling areas are shown in Figure 6.

Figure 6. IGCC Power Plant with Chemical Coproduction



Several different chemicals and chemical production mixes are being considered for this option. Additional studies are underway by TVA to better assess market opportunities and economic risk associated with the production of various coproducts that can be made from syngas. Study results are not available at this time; however, a production scenario has been selected based on previous economical and technical studies which includes the following chemicals:

- Methanol,
- MTBE,
- Formaldehyde,
- Acetic acid,
- Granular urea,
- Urea ammonium nitrate,
- Ammonia, and
- Carbon dioxide

Option 5: Integrated Gasification Combined Cycle Unit, Natural Gas Combined Cycle Units and Gasification Units with Chemical Coproduction (Combination)

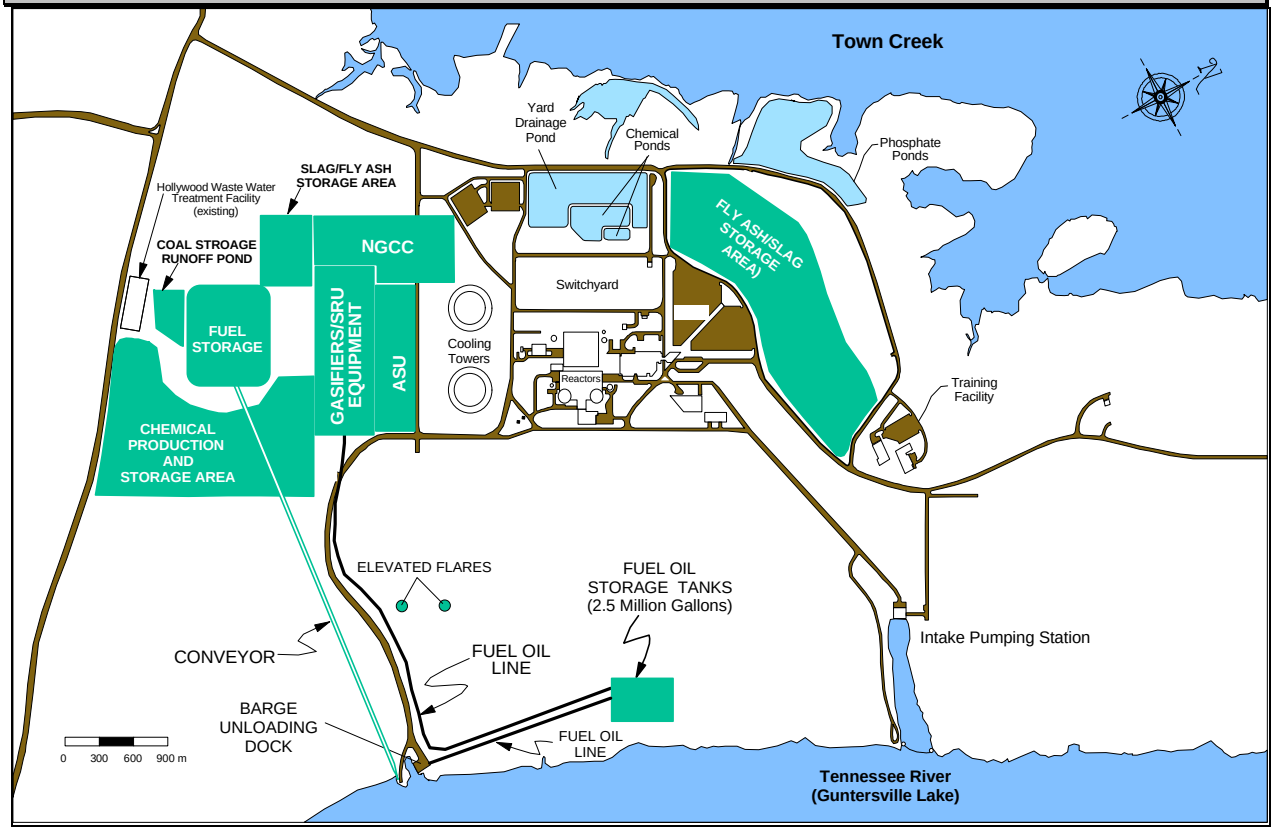
The Combination Option combines the equipment configurations of the NGCC and IGCC/C Options with the concept of phased construction. The first phase for the Combination Option would be the construction of a 335-MW NGCC module. The NGCC module would consist of a natural gas fired combustion turbine, HRSG, and an existing Bellefonte steam turbine system (Unit 2) which may be modified to accept steam from the HRSG.

After construction of the initial NGCC unit is completed, the second phase, an IGCC/C facility, would be constructed. The coproduction phase involves four modules, one consisting of a coal gasification plant, advanced combustion turbine, and HRSG, and three consisting of a coal gasification plant each and related chemical coproduction plants. Excess steam from the gasifiers is routed to the Bellefonte Unit 2 steam system.

In the final phase, a NGCC facility is added. This facility consists of five NGCC units, each with an NGCC unit containing an advanced combustion turbine and HRSG. Duct burners would be included in each HRSG to boost peak power generation. In addition, the Bellefonte Unit 1 steam system may be modified.

The steam produced by four of the NGCC units would be collected and routed to Bellefonte Unit 1 steam system. Steam from the remaining NGCC unit would be routed to Bellefonte Unit 2 steam system. The total power produced from the Combination Option would be 2,565 MW with an additional 300 MW available for peak power requirements. Figure 7 shows the locations of the new facilities required for this option.

Figure 7. Combination of NGCC and IGCC Power Plants with Chemical Coporduction



Description of Suboption Process, Control, and Design Alternatives

The analysis of alternatives in this FEIS involves three tiers. The third tier analysis involves eight suboptions that apply to one or more of the five conversion options. A suboption may be an alternative process, environmental design, or siting configuration. The final decision on many specific technology choices and operational aspects will depend on future market conditions and regulatory constraints. To allow decisionmakers to select a preferred Bellefonte conversion option without the complications of considering an array of process, design, and siting variables, certain simplifying assumptions were made with respect to these suboptions. The selection of these suboptions has important environmental implications.

There are eight suboption choice categories. Each of these is briefly explained below together with the rationale for simplifying assumptions that were made with respect to these choices.

Natural Gas Pipeline Corridor

Sufficient quantities of natural gas do not exist in the Scottsboro area for the conversion options that require use of natural gas. Given the presence of large interstate natural gas pipelines in the region, three potential natural gas pipeline corridors connecting Bellefonte with these interstate corridors were identified. One of these was from a point southeast of Bellefonte, another from a point near Hunstville, Alabama, and a third from near Jasper, Tennessee. The corridor leading northeast to Jasper was determined to be the most likely (at this time) based upon environmental constraints and the presence of parallel right-of-ways that could be available for the new line. Therefore the Conversion Options 2 and 5 assume that gas is transported via this corridor.

Fuels, Feedstocks, And By-Products Transportation Mode

Coal, petroleum coke, limestone, sulfur, slag, and coal ash are several of the high volume solids that will require transport to and from the converted Bellefonte plant. These solid fuels, feed materials, and by-products can be shipped by truck, train, or barge. The selection of the particular transportation mode for each option is dependent upon the transportation economics which relate to source, destination, and quantity of materials.

Gas Turbine

Two generations of combustion turbine technology were considered: “F” technology and advanced “G/H” technology. The use of refurbished gas turbines, modified to run in combined cycle mode, is also possible. The “F” technology was assumed to be the likely turbine selection based on preliminary consideration of electricity output, efficiency, reliability, and installed cost.

Solid Fuel

Solid fuels considered for Options 1, 3, 4, and 5 include coal, biomass, petroleum coke, coal/coke mixtures, refuse derived fuels, and char from coal refining. Biomass and refuse derived fuels were eliminated from detailed consideration because these fuels are not available in sufficient quantities for

converting Bellefonte. A 50/50 mix of petroleum coke and coal was assumed to be the most likely fuel selection based upon fuel availability, costs, and process experience.

Boilers

Three types of conventionally fired boilers were considered for use at Bellefonte. In addition to pulverized coal (PC), atmospheric fluidized bed combustion (AFBC) and pressurized fluidized bed combustion (PFBC) are available. PC boiler technology was selected for the options comparison; however, the impact analyses also take into account the more efficient burning PFBC. A detailed analysis was not completed for AFBC because of its low probability of selection.

Gasifiers

Entrained flow technology was selected because it is the most widely demonstrated and commercialized type of gasification. A composite gasifier representing three commercial gasification vendor designs was used for purposes of determining emissions. The three vendors are Destec, Shell, and Texaco.

Chemical Production

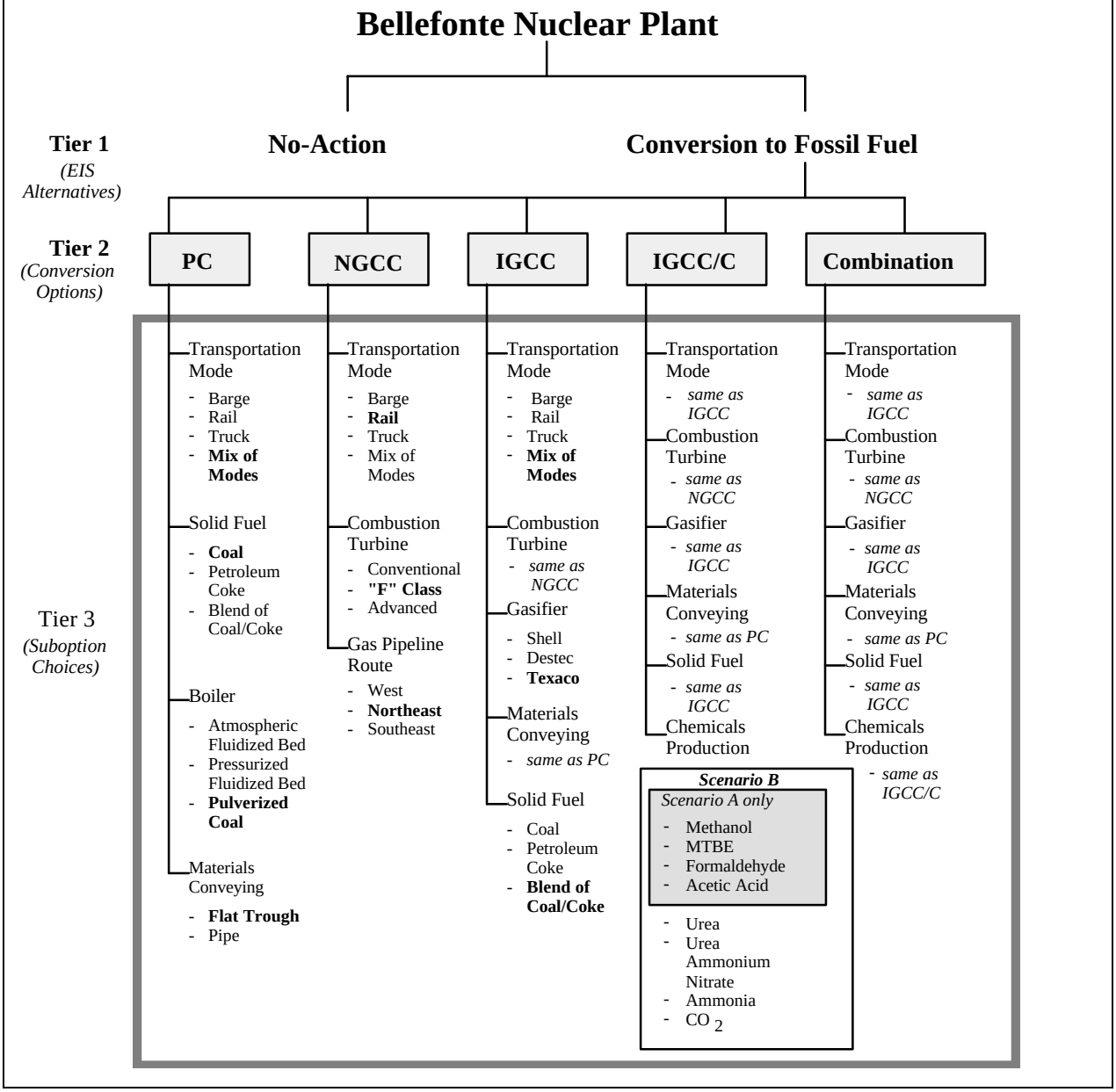
Two chemical production scenarios were considered. One involves methanol derivatives and another involves agricultural chemical production. The suite of chemicals produced from the methanol derivatives was selected for estimating environmental impacts of Options 4 and 5 because the methanol derivatives scenario offers the widest array of coproducts and the most production flexibility.

Coal Conveyance

Coal conveyance options include pipe conveyor and horizontal curve (flat trough). Flat trough conveyance was selected because of economy of operation.

Figure 8 summarizes the technologies, processes, and practices considered in this FEIS and identifies in bold print the choices which are embodied in the evaluated five conversion options.

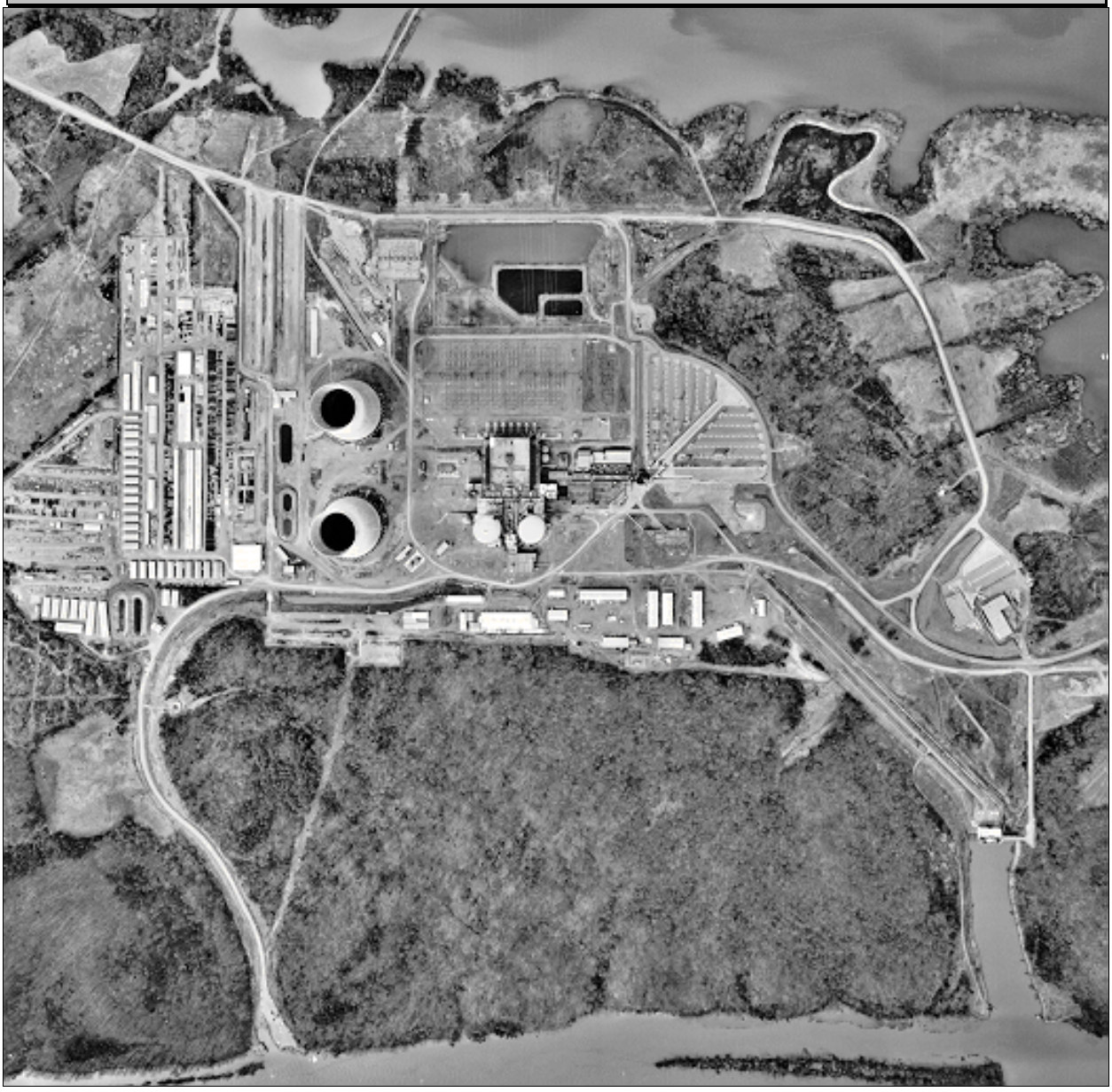
Figure 8. Summary of Option and Suboption Choices



AFFECTED ENVIRONMENT

Existing Bellefonte Nuclear Plant facilities and structures sit on an approximately 1,600-acre peninsula bordered on three sides by the Town Creek Embayment and Guntersville Lake (Figure 9).

Figure 9. Aerial Photograph of Bellefonte



Pertinent information about environmental resources located in or near the area potentially affected by conversion of the plant to fossil fuel is summarized in Table 4.

Table 4. Affected Environmental Resources

Resource Area	Quality or Condition of Resource	Comments/Specifics
Air Quality	Good	Current air pollutant concentrations below standards, area in attainment for all criteria pollutants, plant holds minor source permit from ADEM, other significant sources located within 50 km, terrain-related site constraints caused by elevated escarpment to the SE
Geologic Setting	Good	Some karst terrain and evidence of sinkholes, low regional seismic hazard, site overburden disturbed by previous construction activities
Soils	Good	A few minor spills need remediation prior to construction, remediation plan in effect, "borrow" soil limited on site
Solid Nonhazardous Waste	Excellent	Waste disposed of in permitted offsite landfills, no active onsite disposal areas
Hazardous Waste	Excellent	Waste disposed of in permitted offsite landfills, no active onsite landfills
Surface Water	Excellent	Nearly unlimited availability from Guntersville Lake, quality parameters are within limits, plant currently holds NPDES permit, temperature of intake water exceeds upper ADEM limit periodically during summer, no discharge points (other than storm water) are allowed into Town Creek Embayment, lake use approved for water contact sports and other recreation uses
Floodplains/ Floodways	Fair	Some areas at risk to flooding which may require special flood proofing or avoidance, no floodways exist
Groundwater	Good	Groundwater level generally increases toward northeast, quality acceptable for consumption, no groundwater constraints exist
Terrestrial Ecology	Fair	Many areas previously disturbed, no substantial or unique areas of habitat exist except in the most northeast portion of the site, a heron rookery is located just upriver of Bellefonte across the inlet to the Town Creek Embayment, no threatened plant species are known to exist at Bellefonte, threatened animal species may occasionally use the site, but the habitat does not attract such species from nearby more desirable areas
Aquatic Ecology	Good	Guntersville Lake supports high quality and diverse fisheries and benthic (such as mussels) life, no aquatic species of threatened wildlife have been found in recent years near Bellefonte
Wetlands	Good	Wetlands exist along nearly the entire shoreline of Bellefonte, wetlands along the river front are fringe type and not generally of high quality, similar wetlands are widespread in Guntersville Lake
Socioeconomic	Excellent	Population is diverse and evenly distributed, diverse industry with a third of the jobs in manufacturing, good community/municipal services and housing availability, existing Bellefonte staff is about 80 people
Transportation	Good	Well served by highway, rail, and river transport systems
Land Uses	Good	1600-acre site contains partially constructed nuclear plant, land use in surrounding area is mix of residential, commercial, and agricultural
Aesthetic and Recreation	Excellent	Except for cooling towers and reactor buildings, site facilities are not visible from the river and visible only for short distances along major roadways, site is most visible to residents along Town Creek Embayment, the embayment and lake supports recreational fishing, hunting is allowed on TVA lands outside the restricted plant areas
Cultural Resources	Good	Contains three protected sites of archaeological significance. No structures of historical significance are present.
Noise Conditions	Excellent	Levels typical of a quiet rural community, no local sources of noise

The quality of the affected environment at Bellefonte is good to excellent for most resource areas. No resource area poses a significant obstacle for conversion of Bellefonte. This is because the affected area has been disturbed previously as a result of nuclear plant construction activities and because no unique terrestrial or aquatic habitat nor protected species are found on site. The site is well served by transportation and municipal services.

ENVIRONMENTAL CONSEQUENCES

Environmental resources and values were evaluated for impacts construction and operation of each proposed conversion option. Tables 5 and 6 compare impacts for each conversion option for construction and operation, respectively. Impacts are assigned a relative impact severity, using a range of pluses and minuses, as compared with the No-Action Alternative. Impact duration is described as either temporary (lasting only a few months or the period of construction) or permanent (life of the plant). Impacts are described as being positive or negative at three levels: light, moderate, or important.

This format is designed to allow the direct comparison of options but suffers from a subjective bias introduced by the consolidation of evaluation results in an unweighted framework. An example of this is the air quality impact category which forces the derivation of a single category assignment from considerations of the impacts from criteria air pollutants, hazardous air pollutants, acid rain, global warming, visibility and odors. Chapter 4 presents detailed results for a more thorough understanding of the scientific basis for impacts and ratings.

Note that impacts are presented for each of the five conversion options AND for the incremental impacts associated with a possible connected action: the construction and operation of a natural gas pipeline. Since pipeline construction would not be undertaken if supplies are brought to the Bellefonte area for reasons unrelated to Bellefonte, it was believed unfair to group these impacts with the two affected options, NGCC and Combination. By presenting pipeline impacts in this way, the reader can either consider these incremental effects or not, depending on the gas supply situation at the time a decision is made regarding a conversion option.

Table 5. Summary of Construction-Related Impacts for Each of the Five Bellefonte Conversion Options Compared to the No-Action Alternative

	CONVERSION OPTION					
IMPACT CATEGORY	1 PC	2 NGCC	Natural Gas Pipeline	3 IGCC	4 IGCC/C	5 Combination
Physical Resources						
Air Quality	T –	T –	T –	T –	T –	T –
Geologic Setting	P –	N	P –	P –	P –	P –
Soils	P –	N	T – –	P –	P –	P –
Solid Nonhazardous Wastes	T –	T –	T –	T –	T –	T –
Hazardous Wastes	T –	T –	T –	T –	T –	T –
Surface Water						
Availability	N	N	T –	N	N	N
Quality	T – – –	T –	T – –	T –	T –	T –
Floodplains/Floodways	N	N	N	N	N	N
Groundwater						
Availability	N	N	N	N	N	N
Quality	N	N	T –	N	N	N
Biological Resources						
Terrestrial Ecology	P –	P –	T –	P –	P –	P –
Aquatic Ecology	T –	N	N	T –	T – –	T – –
Wetlands	P –	N	T –	P –	P –	P –
Man-Made Environment						
Socioeconomics	T ++	T +	T +	T ++	T ++	T +++
Transportation	T – –	T –	T –	T – –	T – –	T – –
Land Use	P –	N	P –	P –	P –	P –
Aesthetics & Recreation	P – –	P –	T –	P – – –	P – – –	P – – –
Cultural Resources	N	N	N	N	N	N
Noise Impacts	T –	T –	T –	T –	T –	T –
Safety and Health	T	T	T	T	T	T

Key to impact description symbols:

N means no change or negligible impacts
+ or - means light positive or negative
++ or -- means moderate positive or negative
+++ or --- means important positive or negative
T means temporary (short-term)
P means permanent (lifetime of plant)

Note: For a particular impact area (i.e. air quality, socioeconomic, etc.), the degree of impacts are expressed only relative to the No-Action Alternative. No measure of the importance between impact areas has been applied.

Table 6. Summary of Operation-Related Impacts for Each of the Five Bellefonte Conversion Options Compared to the No-Action Alternative

	CONVERSION OPTION					
IMPACT CATEGORY	1 PC	2 NGCC	Natural Gas Pipeline	3 IGCC	4 IGCC/C	5 Combination
Physical Resources						
Air Quality	P – –	P –	N	P – –	P – – –	P – – –
Geologic Setting	N	N	N	N	N	N
Soils	N	N	N	N	N	N
Solid Nonhazardous Wastes	P –	N	N	P –	P –	P –
Hazardous Wastes	P –	P –	N	P –	P –	P –
Surface Water						
Availability	N	N	N	N	N	N
Quality	P – – –	P –	N	P – –	P – –	P – –
Floodplains/Floodways	N	N	N	N	N	N
Groundwater						
Availability	N	N	N	N	N	N
Quality	P –	N	N	P –	P –	P –
Biological Resources						
Terrestrial Ecology	N	N	P –	N	N	N
Aquatic Ecology	P – –	N	N	P – –	P –	P –
Wetlands	N	N	N	N	N	N
Man-Made Environment						
Socioeconomics	P +	P +	N	P ++	P ++	P +++
Transportation	P – –	P –	N	P – –	P – –	P – –
Land Use	N	N	P –	N	N	N
Aesthetics & Recreation	P – –	P –	P –	P – – –	P – – –	P – – –
Cultural Resources	N	N	N	N	N	N
Noise Impacts	P –	P –	N	P – –	P – –	P – –
Safety & Health	T –	T –	T –	T –	T –	T –

Key to impact description symbols:

N means no change or negligible impacts
+ or - means light positive or negative
++ or -- means moderate positive or negative
+++ or --- means important positive or negative
T means temporary (short-term)
P means permanent (lifetime of plant)

Note: For a particular impact area (i.e. air quality, socioeconomic, etc.), the degree of impacts are expressed only relative to the No-Action Alternative. No measure of the importance between impact areas has been applied.

Air Quality

Transient emissions of gaseous and particulate air pollutants will occur throughout the construction phase of any Bellefonte conversion option or variant. The impacts of these emissions on local and regional air quality will be minimal and directly dependent upon the amount of necessary new construction. Since the Bellefonte site was previously prepared for the construction of a 2,400 MW nuclear generation facility, anticipated construction-related air quality impacts will be less than for a new site. Accordingly, the overall air quality impact of construction activities for any of the proposed conversion options or variants will not be significant.

The power generation phase of all proposed options or variants will result in the emission of regulatorily significant quantities of a number of air pollutants including, most importantly, sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM10), and carbon monoxide (CO). The FEIS addresses a number of specific air quality issues in detail including potential impacts on ambient air quality standards, prevention of significant deterioration, plume blight, hazardous air pollutants, odors, cooling tower drift, cumulative impacts, air quality related values, regional haze, acidic deposition, and climate change. Where appropriate, EPA-approved dispersion models are used to assist in the assessment of these issues.

Although no ambient air quality standards would be exceeded by any option or variant, some, such as the as-configured PC Option and PFBC variant, for example, will have difficulty demonstrating compliance with short-term Prevention of Significant Deterioration (PSD) Class I and Class II increments for SO_2. In contrast, the lower overall emissions rates from the NGCC and IGCC/C Options appear substantially more innocuous from an air quality perspective.

Important issues identified in this document that will be further addressed upon selection of a conversion option or variant (during permitting) include operational contributions to:

- Class I and/or Class II PSD increments for SO_2 and PM10,
- Plume blight and regional haze in Class I areas, and
- Local and regional production of secondary air pollutants (particularly with respect to recently promulgated standards for ozone and PM2.5).

Notwithstanding the continuing importance of these issues, it should be recognized that a range of additional design and emissions control options are available to bring any of these options or variants

into environmental compliance and that the construction and operating permitting process requires substantive demonstration of compliance with both source-related requirements and ambient air quality standard and increment regulations. Finally, to the extent that the operation of the constructed facility allows the less frequent use or retirement of older, less well controlled generating resources, there would be a net decline in regional pollution emissions and a corresponding improvement in regional air quality and air quality related values.

The air quality impact of the chemical operation phase for the IGCC/C and Combination Options and their variants will also be of environmental significance. However, since the preliminary design of the chemical operations calls for the combustion of purge/off-gas streams with the syngas or duct firing prior to the HRSG, emissions from chemical production will be negligible. As for generation, chemical operations will be required to demonstrate compliance with environmental laws and regulations and, if needed, additional design and emissions control options may be applied.

The impact ratings reflect the expectation that technology configurations actually constructed would include emission controls sufficient to ensure compliance with regulations and PSD increments. The important negative permanent ratings assigned to Options 4 and 5 are related to the potential air quality issues inherent in the operation of a chemical plant.

Geologic Setting

The lightly negative impacts for construction of all five options are based on the need to provide bedrock testing and grouting to reflect the typically karst terrain in this area of North Alabama.

Operation results in no negative impacts to geologic stability.

Soils

Soils of agricultural value within the footprint of each conversion option will be unavailable for future use. The lost agricultural productivity of each option is variable, depending on how much of the affected land was disturbed by previous construction/industrial activity, and how much land will be impacted by

new construction/industrial activity. The preferred NGCC Option was assigned a negligible impact because of its relatively small footprint, which occurs on land already permanently impacted by present industrial facilities. The other options were assigned a lightly negative permanent impact rating because of proposed additional construction and industrial needs, such as for fuel, by-product, and waste storage/disposal. All conversion options, however, will have a negligible impact on county agricultural productivity. Soils impacts for construction of the natural gas pipeline, an effect incremental to the NGCC and Combination Options, were classified as moderate because of the disturbance to the topsoil along its route.

Operation would result in no additional land use, and no impacts would occur after construction is complete.

Solid Nonhazardous Wastes

Solid nonhazardous wastes generated during construction would be disposed off site at state-permitted landfills. The light temporary impacts shown for each conversion option are indicative of the small pressure that might be placed on off site landfill capacities during construction only.

The combustion by-product materials generated by coal utilization, Options 1, 3, 4, and 5, would be marketed to the highest extent possible. The materials that cannot be marketed, which include off-specification ash, slag, and gypsum generated during unit startups, etc., would have to be disposed in an acceptable way. For this FEIS, it has been assumed that all waste would be disposed in appropriately designed areas on the Bellefonte property. The disposal of these materials is not regulated by ADEM; however, any disposal area will conform to good engineering practice which requires that a buffer zone of low permeability soil or a liner separate the disposed solids from groundwater. The lightly negative permanent ratings for the operation of the coal-consuming options (Options 1, 3, 4, and 5) are associated with the expected generation of some off-specification solids which cannot find a market and thus requires disposal for the life of the plant. Noncombustion wastes generated during operation of all five conversion options will be taken to nearby state-permitted municipal landfills.

Hazardous Waste

The lightly negative temporary impacts during construction assigned to all options reflect the expected generation of some low-volume wastes which prove to be characteristically hazardous, thus requiring special handling, reporting, and disposal at appropriately permitted disposal facilities. These wastes would be transported to the TVA Hazardous Waste Management Facility in Muscle Shoals, Alabama, for disposal elsewhere.

Larger quantities of hazardous wastes may be produced during operation also. These wastes will be handled like the hazardous wastes from the construction phase. This resulted in the assignment of lightly permanent negative ratings to all options to reflect this minimal impact extending for the life of the plant.

Surface Water

Neither construction nor operation of the five conversion options will pose any problems from a surface water availability standpoint. The proximity and volume flow of the Tennessee River provides a ready source of raw water of sufficient quantity to meet foreseeable needs, including the operation of both natural draft cooling towers. No environmental impacts are expected.

Construction activities for the five conversion options, considering the Best Management Practices (BMPs) required for TVA construction projects, are not expected to result in any surface water quality problems. All construction activities which disturb more than five acres will require a special construction activities runoff permit. The construction storm water runoff for the PC Option will result in increased monitoring and controlling to prevent soil erosion into surface streams, thus the assignment of a higher negative temporary impact.

The impacts during operations are related to the handling, storing, and hauling activities of all materials around the site. The PC Option is highly negative mainly due to the storing of coal in the coal pile; the additional hauling of fly ash and bottom ash; and the increased acreage needed on site for storing the fly ash and bottom ash, and the wet stacking of gypsum. Erosion control structures and measures will be used by TVA to limit the impact from all five options.

Several types of limitations are typically placed on point-source waste water discharges to surface waters at the Bellefonte site, including water quality-based limits and technology-based limits for various types of sources. Typically, waste water generated as a result of power production and industrial/manufacturing operations is treated to the level needed to meet these limits before discharge. No problems are expected in the removal of pollutants to the levels required to comply with regulations, although treatability studies have not yet been completed for comingled streams, especially those for the options with chemical production (Options 4 and 5). The use of the existing cooling towers, assumed for all conversion options, may raise an issue related to the discharge of heated blowdown discharge. For several days during the course of a typical summer, the instream ambient temperature of the Tennessee River exceeds the maximum temperature allowed for discharged effluent. This situation creates an anomaly since the temperature of the extracted water would be higher than that allowed for any discharge. The approach planned for Bellefonte is to obtain a 316(a) variance for temporary releases of heated effluent during such periods. This potential problem is the reason for the moderately negative overall ratings. If a variance cannot be obtained, TVA may be required to lower the temperature of discharge water before its release to the Tennessee River, which would increase costs.

Floodplains/Floodways

For all of the conversion options, facilities would be sited to provide a reasonable level of protection from flooding. All facilities related to the production of power would be located outside the limits of the 500-year floodplain, elevation 603.1 feet above mean sea level. The only facilities located within the limits of the floodplain would be repetitive actions: the flyash and bottom ash storage area, and the gypsum storage area. Alternatives to locating the flyash and bottom ash, and gypsum storage areas within the floodplain were evaluated and documented to support a determination of "no practicable alternative" to the proposed floodplain siting. Construction of the storage areas would not adversely impact flood elevations and containment dikes would be constructed with top elevations above the 500-year flood to reduce the possibility of flooding of these areas. The project would comply with the requirements of Executive Order 11988 (Floodplain Management).

There would be no negative impacts associated with this resource area for any conversion option after construction.

Groundwater

No groundwater would be used during either construction or operation of the five conversion options; therefore, there would be no impacts to groundwater availability.

Construction of conversion facilities is expected to have no detectable impact on the quality of groundwater. For operation, a small risk of contamination is associated with each conversion option except NGCC because of the increased array of feedstocks, products, by-products, wastes, etc., to be handled, processed, and/or stored on site. Under normal circumstances, groundwater quality would be protected by use of BMPs, liners, containment vessels, and other measures. Spills and accidental releases would be decontaminated and mitigated in accordance with TVA procedures (Spill Prevention Control and Countermeasure Plan) and ADEM regulations. However, a remote possibility exists for the failure of a storage area liner or containment system during a catastrophic event or an earthquake. For these reasons, a lightly negative permanent effect has been assigned to all conversion options except NGCC, the preferred option, which involves little or no risk of groundwater contamination.

Terrestrial Ecology

Because of the small footprints and quality of the terrestrial habitat that would be disturbed by conversion of Bellefonte, impacts for this category would be insignificant. No rare plants or unique or uncommon plant communities will be affected. Much of the affected area has been previously disturbed by construction activities, therefore, no important woodlands or grasslands would be affected by construction. Animal species found in the affected area are regionally abundant. No protected species are found on the Bellefonte site. The lightly negative, but permanent, impacts of construction are related to the small habitat losses expected.

Operation will have no additional impacts on terrestrial biological resources.

Aquatic Ecology

Effects to aquatic resources are temporary during construction. Most effects would be the result of stormwater runoff and leaching from disturbed or contaminated areas, construction of a barge terminal,

coal unloader facility and the lowering of the existing cooling tower blowdown diffuser pipes five feet to allow barge movement. The dredging and barge terminal construction activities would result in near field impacts on resident aquatic communities as a result of increased turbidity dislocation of mussels, fish, and other water life. Protected species have not been found in the affected portion of the Tennessee River. BMPs will be developed to avoid primary spawning seasons and to otherwise minimize impacts. The assignment of moderately negative ratings for Options 4 and 5 are related to the construction of an expanded barge terminal and loading facility for coproducts. Light temporary impacts are expected for the PFBC and IGCC Options, while no impact is expected for NGCC, the preferred option, which avoids the construction of a barge terminal.

Impacts during operation are related to the intake of raw water (entrainment and impingement of aquatic life), possible spills of raw material and products during barge loading/unloading, possible accidental introduction of fuels and products into surface water, and permitted waste water discharges. Although no significant long-term, irreversible impacts are expected to aquatic communities in this stretch of the Tennessee River, small impacts will occur for Options 1, 3, 4, and 5 (no aquatic effects are expected for the NGCC Option, the preferred option), during the course of normal operation and during spills or upsets. The ratings are related to the degree of impacts associated with the amount of water used, extent of barge loading/unloading activities, the number of fuels, chemicals and by-products involved in each option, and the relative impacts of toxic and thermal pollutants. The PC and IGCC Options were assigned a moderately negative permanent impact, whereas the IGCC/C and Combination Options were assigned lightly negative impacts, primarily on the basis of reduced coal use.

Wetlands

Options 1, 3, 4, and 5 will require the elimination of 24 acres (9.8 hectares) of aquatic bed and forested wetland islands for the construction of barge handling facilities to handle coal. This negative impact will be permanent for the life of the facility, and can be compensated through the Section 404 of the Clean Water Act mitigation process. The NGCC Option, the preferred option, will not impact any wetlands. The associated gas pipeline corridor may impact limited areas of wetlands, but those impacts will be temporary and insignificant. The lightly negative permanent impact ratings for Options 1, 3, 4, and 5 are associated with the loss of the 20 acres of wetlands.

No additional loss of wetlands would occur during operation of the converted Bellefonte.

Socioeconomics

The socioeconomic impacts for construction are primarily positive because of jobs creation and the multiplying benefit to the local economy. Ratings are directly proportional to the number of workers needed during construction for each of the five conversion options. Some negative impacts were noted for demands on housing and social services, but these were more than overcome by the increased taxes available to local governments and the influx of construction-related dollars. The rating for the Combination Option was judged to be important with an estimated peak employment of 3,447 and with 15,759 person years of employment over ten years, as compared with peak employment of 550 and with 3,008 person years over eight years associated with NGCC, the preferred option, which received a lightly positive rating.

Impacts during operation were similarly treated, except they were long term. It is expected that of the permanent work force who would move into the area (about half the work force), close to 90% would buy or rent houses and 90% would bring their families. Employment at the plant, depending on the conversion option, would result in annual wages ranging from $8.8 to over $28 million dollars annually. Impacts on social services, such as fire departments and schools are expected to be small.

Transportation

Additional traffic will be generated during the construction phase of the project. This additional traffic will be most noticed during shift changes. The capacity levels of the local highways will be negatively affected. Impacts would be most acute on Bellefonte Road and Jackson State Route 33 which lead to U.S. Highway 72. Traffic on U.S. Highway 72 would be minimally affected, but some loss of service capability, i.e., lower operating speeds and momentary stoppages, would occur on the roads leading to U.S. Highway 72. Highway impacts can be cost effectively mitigated through staggered work hours and carpooling. Impacts on railroads and river transport systems are expected to be minimal during construction. Construction of new rail access and layby tracks and upgrading of existing tracks leading to Bellefonte would be needed to support the non-NGCC Options. Moderately negative impact ratings were assigned all to conversion options except NGCC, which was lightly negative.

The impact on the local road network during operation of the converted plant would be reduced since the daily permanent work force is somewhat lower. Use of rail and river transport is expected to increase significantly, except for NGCC, because of the need to transport feedstock and products to and from the site. An increase of about 10,600 rail car units per year was projected to serve the IGCC/C and Combination Options. The existing rail system in North Alabama is not expected to experience any congestion from this additional demand. The design coal for all coal-consuming options involves the import of Illinois No. 6 coal by barge. For the IGCC-based options, a coal blend with petroleum coke is the design basis which may involve transport of supplies from the Gulf Coast area, also by barge. Additional barge traffic is estimated to be 6,073 barges annually for the PC Option. This activity places additional demand on lockages through the four dams on the Tennessee River downstream of Bellefonte. Using existing lock capacities, it was projected that the additional barges could be easily accommodated except at Kentucky Dam which currently experiences large delays. Alternatives for importing fuel include rail and barge combinations using various coal transfer terminals located on the Tennessee River but these alternatives were not evaluated in detail. The NGCC Option, the preferred option, received a lightly negative impact for this category primarily for its impacts to roadway use due to workforce commuting. Moderately negative impact ratings were assigned to other options. These impact ratings are predominately related to impacts to road, rail and barge impacts. All impacts are considered to be permanent.

Land Use

Construction would result in the consumption of a small amount of acreage currently used or available for hay production. Land requirements range from 46 acres for the NGCC Option to 225 acres for the Combination Option. However, land use impacts would on the whole be insignificant for all conversion options.

Additional impacts on land use are expected for operation under current plant operating assumptions. These include the disposal of unmarketable combustion residue. The largest impact on land use is for the PC Option, which is projected (assuming zero marketing success) to require approximately 300 acres for 20 years of full operation.

Aesthetic and Recreation

Construction activities are typically viewed as transient disturbance of the environment from an aesthetic and recreation standpoint. However, several aspects of each of the conversion options will involve a lasting visual reminder of changes at the Bellefonte site. These include the new mooring cells, barge terminals, and coal transfer facilities along a 4,500-foot stretch of the Tennessee River constructed to serve the non-NGCC Options and construction of combustion flue gas stacks ranging in number from two to twelve and in height from 200 to 580 feet. A fuel oil storage tank is associated with two of the five options. These facilities will be noticeable to the casual observer from long distances in any direction and from a considerable stretch of U. S. Highway 72. Lightly negative permanent ratings were assigned to NGCC, TVA's preferred option, because of the avoidance of barge facilities and fuel tanks. Permanent moderately negative ratings were assigned to PC, while the options involving IGCC were given important negative ratings, partly because of the additional structures involved.

Operation of all conversion options would result in the emission of air pollutants and noise from combustion turbines (except for PC) and the cooling tower. The flare stack (not used for NGCC or PC) would probably be easily heard at the plant boundary. Depending on conditions, the flame from the flare stack would be visible for large distances, especially at night. Plumes from combustion stacks could be visible on some occasions, but opacity is expected to be minimal because of the advanced air pollutant control technologies to be used. Also, a negative impact along Jackson County Road 33 would be realized from the resultant truck traffic associated with the transportation of some raw materials to the plant and by-products to markets. Important negative permanent impacts are expected from Conversion Options 3, 4, and 5, while the PC Option impacts were rated as moderate. The NGCC Option was given a rating of lightly negative.

Cultural Resources

Previous surveys of the Bellefonte site identified five archaeological sites. However, none of these sites are within the area affected by the construction of any of the five conversion options and therefore there should be no impacts. All structures associated with the original town site of Bellefonte eligible for

placement on the National Register of Historic Places were removed prior to the conversion project. Consequently, there are no impacts to structures with potential historical significance for construction.

Operation of a converted Bellefonte plant will not impact cultural resources.

Noise Impacts

Routine construction activities associated with all five conversion options will generate noise that is predicted to have no impact except a minor increase in background sound levels for Options 2 through 5 at the nearest fence line. For all options, there will be short periods in which steam lines are cleaned out prior to plant operation in which noise levels would be very loud at the nearest fence line and nearest residence. These are unavoidable, short-term, temporary impacts that will be mitigated through notification of employees and nearby residents to avoid the "startle effect" on residents and hearing damage to employees near the power block.

Routine operating conditions, even at full capacity, would not result in important adverse impacts to sensitive off-site receptors from any of the five conversion options. Noise modeling of sources in the power block, at the barge dock, and at the coal pile indicates that during routine operating conditions there will be substantial increases in noise levels at the nearest fence line for all but TVA's preferred option, (NGCC); however, none of the options result in levels greater than the 65 Ldn threshold of significant adverse impacts. The PC Option was predicted to result in the greatest increase in noise levels.

Three of the five conversion options—IGCC, IGCC/C, and Combination—involve the use of flares. During the times when flaring is occurring (estimated to be no more than one hour per event and no more than 90 events per year) no significant adverse impacts are expected although the flaring would result in a substantial increase in sound levels at all receptors. By scheduling gasification start ups and shut downs for daylight hours, TVA can mitigate the unavoidable impacts of flaring. Finally, there will be noise impacts from truck traffic hauling combustion by-products from the plant. These impacts are greatest for the PC conversion option and are absent from the NGCC Option.

For these reasons, the NGCC Conversion Option is the least impactive overall with the other four options resulting in minor impacts with occasional moderately high levels from flaring and/or truck traffic.

Safety and Health

Construction and operation of any large and complex facility involving a wide array of crafts and personnel interaction poses some risk to the safety of workers. Impacts to safety of workers would be minimized by TVA's safety program which requires workplace standards, workplace accident investigation, emergency response programs, individualized training, job safety planning, training, employee involvement, and workplace inspections, monitoring, and audits. Lightly negative temporary impacts were assigned to each conversion option.

Electromagnetic Fields (EMF)

TVA's standard location practice has the effect of minimizing public exposures to transmission line EMF. The transmission line route selection team used a constraint model that placed a 300-foot radius (91.4 meter) buffer around occupied buildings. For schools, a 1200-foot (366-m) buffer was used. The purpose of these buffers was to reduce potential land use conflicts with yard trees, outbuildings and ancillary facilities, and to reduce potential visual impacts and possible EMF-related controversy. Though not absolute location constraints, these buffers weigh heavily in location decisions, influencing selection of route options and alignments. Because EMF diminishes so quickly with distance, the routing of transmission lines using constraint buffers effectively reduces potential public exposure to EMF.

Health Effects from the Fuel Cycle

For the PC, IGCC, and IGCC/C Options, coal would be the primary fuel source. For the acquisition of coal, significant reductions in rates of mining deaths per number of employee hours worked have been achieved over the last few years in the mining industry. A combination of factors has been responsible for the dramatic safety gains in the U. S. mining industry since the turn of the century. The rate of coal mining deaths decreased from about 0.20 fatalities per 200,000 hours worked by miners (or one death per million production hours) in 1970 to about 0.07 fatalities in 1977 and an average of 0.04 fatalities for the 1990-94 period.

Natural gas would be the primary fuel for the NGCC and Combination Options. Natural gas extraction is technologically simpler and less labor intensive than coal mining, consequently, health effects are fewer and less pronounced.

Impacts Due to Accidents

The accident scenarios evaluated in Section 4.2.18.3 are considered to be rare occurrences. The approach used in this section is to identify reasonably foreseeable accident scenarios and, using guidance provided by pertinent regulations which affect the operation of facilities like those described herein, develop information which would provide residents living near Bellefonte a better understanding of possible health risks. As a federal agency, TVA is not subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) or the Occupational Safety and Health Act. However, TVA is committed to complying with regulations to protect public health and worker safety. As a matter of policy and consistent with Executive Order 12856, TVA complies with EPCRA to the extent other utilities do. TVA must internally comply with Occupational Safety and Health Administration substantive requirements as these are incorporated in its occupational health and safety manual. All facilities would be designed and constructed to prevent hazards from impacting the environment and public health. In addition, TVA would develop and implement safety programs with the primary goals of minimizing potential for accidents and protection of the public and environment.